THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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ISSUED BY
SCIENCE SERVICE
B and 21st Streets
WASHINGTON, D. C.

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SUBSCRIPTION: $5 A YEAR, POSTPAID

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Vol. VIII, No. 248 Saturday, January 9, 1926

HOW MENTAL ABILITY VARIES WITH AGE AND RACE

How psychologists measure the workings of the mind, and how the results of their studies are applied to everyday life, were described by Dr. J. McKeen Cattell, editor of "Science", before the American Association for the Advancement of Science, of which he is retiring president.

"The life of the unicellular amoeba consists largely in reacting to the immediate environment, and this holds through the whole range of animals to our own behavior in daily life," Dr. Cattell said. "The creature whose responses are prompt and correct, not disturbed by irrelevant conditions and events, is the one that survives and succeeds. There are some 700,000 motor-car accidents annually in the United States, about ninety per cent of which are due to the human factor.

"It is a satisfaction to be this year associated with the work of the Highway Safety Conference arranged by the Secretary of Commerce, which is to determine the physical and mental examinations for drivers and public chauffeurs that should be adopted for a uniform system of licenses in the several states and thus to apply laboratory experiments to a useful purpose," he continued." "Psychological methods are now used for the selection of taxicab drivers in a number of cities with resulting increase in efficiency and decrease in accidents. The most important work for psychology and its most useful applications are the measurement of individual, group and racial differences, and the determination of the extent to which these depend on native endowment and on subsequent experience," Dr. Cattell went on. "Indeed it is arguable that this is the most pressing problem of science and of society."

"If each of us from the moron to the federal president were selected for the work that he can do best, the work fitted in the best way to the individual and the best training given to him, the productivity of the nation would be more than doubled and the happiness of each would be correspondingly increased. If the best children were born, and only they, the welfare of the world would be advanced beyond the reach of practical imagination."

"The human mind reacts to different stimuli at different ages in various ways, and accurate knowledge of these changes is important," according to Dr. Cattell.

"How we learn, the best way to learn, the right age at which to learn different things, the transfer of learning from one field to another, are subjects of fundamental importance in psychology and in education," he said.

"The age curve is of fundamental interest for psychology. Thus, for example, a child can learn to pronounce his own or a foreign language best at the age of about three years; there is then a drop and after about twelve years he can not learn correct enunciation.

"Perhaps a boy can learn to ride a bicycle best at the average age of ten, to drive a motor car at the age of sixteen. Our most original ideas probably come in the early twenties. Some of us may hope that the curve for forming correct judgments rises at least to the age of sixty-five."

"Our primary school system consists largely in trying to teach children with much labor and resulting stupidity on the part of both teacher and pupils, mathematical relations a couple of years before the organism is ready and could respond to them without effort. Then as this is the easiest subject in which to examine children, they are promoted from grade to grade mainly on performance in arithmetic without regard to individual differences in other kinds of work.

Reading character by external physical signs is difficult and unreliable," Dr. Cattell said; "no correlation has been found in the Columbia laboratory between size or shape of head and ability of any sort. There is no known relation between complexion, forehead, nose, chin or other features and psychological traits.

"The reading of character by physiognony or graphology is the occupation of charlatans. It is difficult or impossible to tell even the sex of the individual from the features of the face or from the handwriting. These are, of course, legitimate subjects of study."

Dr. Cattell also explained how curves could be drawn showing the historical distribution of eminent men by nationality and performance.

"An analysis of the kind of performance shows that France has excelled in war, science and scholarship, England in politics, poetry and philosophy, Italy in art" he said. "Of the eighteen great musicians, Germany has produced ten, Italy six. Of the fourteen great explorers, England has produced five, Spain four.

Though text-books and treatises on history, at least until the most recent period, are mainly concerned with war and politics, there have been fewer eminent soverigns, soldiers and statesmen than scientific men, philosophers, poets, artists and the like.

The rising curves for science, the falling curves for philosophy and the church are significant. Soldiers have been surpassed in numbers by men of science and the curves predict a gradual cessation of war and the predominance of science.

HUMAN MIND RESISTS NEW IDEAS

How a new idea must fight for existence like an unwelcome intruder was described in a paper by Dr. Edwin E. Slosson, director of Science Service, read at the meeting of the American Association for the Advancement of Science by Dr. Vernon Kellogg, secretary of the National Research Council. "To symbolize knowledge by light, and ignorance by darkness is as old as science itself" Dr. Slosson said, "but the metaphor is essentially misleading, for darkness is negative and offers no resistance to the diffusion of light. But ignorance is not inert but actively opposes expansion of knowledge.

"No cranium contains a vacuum. It is always filled with something, and, in the case of certain individuals, filled with matter which is impenetrable or at least difficult to make an impression upon.

"In actual life," Dr. Slosson continued, "ignorance is allied to conservatism and the combination is a strong one. In order to introduce a new idea into the mind of man, it is generally necessary to eject an old one.

"When a new idea is born in the mind of one man, it starts out in the world with a majority of 1,600,000,000 against it. If the question of whether the earth is round or flat or revolving or stationary were put to a popular referendum of the entire world at the present time and compulsory voting were required, the Copernican theory of the universe would be repealed by an overwhelming majority."

In speaking of the instinctive reaction of people against new ideas, Dr. Slosson said:

"The education of adults is more difficult than the education of children because the brains of elders are all cluttered up with ideas that have to be cast out or moved about to make room for new notions. We have looseleaf ledgers and encyclopedias nowadays, and we need loose-leaf brains so that we can keep our mental store of knowledge uptodate."

"One can lay contradictory ideas up in one's brain side by side like books on a shelf," Dr. Slosson said. But you can only do that when the ideas are dead. Live ones brought into contact quarrel with each other and get knocked about.

"Each advance in religion, as well as in science, meets the same instinctive reaction of opposition. It is as noticeable in the most trivial deviations from conventional customs as it is in changes in our fundamental conceptions of the universe.

"In our own day, the transatlantic liner which recently adopted the Diesel engine as a substitute for the steam engine, was obliged to erect two huge and useless smoke stacks in order to resemble the steamers of competing lines, because passengers refused to patronize a vessel which did not have these familiar and visible signs of its engine power."

"And all through the history of science" said Dr. Slosson, "we find that new ideas have to force their way into the common mind in disguise, as though they were burglars instead of benefactors of the race."

DISEASES BLAMED FOR HAIR-TRIGGER TEMPERS

If some one carelessly steps on your foot and you become violently angry perhaps the explosion is due to the fact that years ago youhad scarlet fever or some other illness.

This question of whether disease affects the emotions, and the other point of view, of whether certain types of constitution are responsible both for diseases and for increased emotion were discussed by Dr. George M.Stratton, psychologist of the National Research Council, at a meeting of the American Psychological Association. Expressions of anger and fear in more than 1,000 college students were studied by Dr. Stratton in connection with the facts of their physical history. Twenty classes of diseases, including heart trouble, nourasthenia, and influenza, were represented.

"There is a difference between the data on students who have always been normally healthy, and those who have a disease record," he stated. "Individuals who have had disease show a somewhat more intense emotional reaction in anger situations than those who have not had disease. The intensity of fear responses however, does not seem to be different in the two classes of individuals."

"Men who have disease histories appear to be thrown farther from normal and into readiness for somewhat more intense anger than do women who have had a similar history," said Dr. Stratton. "And the importance of the different diseases is probably not entirely the same with menand women. Influenza, for example, which thus far has revealed little or no importance for the anger reactions of women, appears to be of considerable importance for the anger reactions of men."

Among the questions which should be investigated are: the cumulative effect of several diseases on the emotions of an individual, whether diseases in childhood are more closely linked with emotional differences than diseases in later life, and whether there is some common factor in certain diseases which is closely connected with emotional make-up of the individual, Dr. Stratton said.

URGES COOPERATION IN SCIENCE AS IN INDUSTRY

Speaking before the scientists gathered for the annual meeting of the American Association for the Advancement of Science, Dr. Vernon Kellogg, permanent secretary of the National Research Council, told members of the organization that cooperation and coordination need not cramp their style in any way.

"While scientific men will agree that organization is a good thing in business, in production and marketing, in carrying on war and managing a fleet some of them do not at all like the word 'organization' used in connection with science. They say it is out of place and that science, like music and art, ought not to be, and cannot successfully be, organized.

"This criticism proceeds not from any conviction, growing out of the observation of scientific work accomplished in this way, but from a rather widely accepted assumption that most of the great advances in scientific knowledge have come from men working alone," he continued. "It is true that most of the epoch-making events in the history of scientific progress are linked with the names of single individuals.

"But a careful examination of the history of these epochal events will show that their coming about has not been due to the efforts of these individuals alone, but to a rather sudden crystallization around them of a solution to which many men and many minds had contributed their parts.

"Of course it has come about at that time and place because of the superior understanding, by the final contributor, of the meaning of the many facts gradually gathered from many places. Because of this knack for seeing the meaning and for being able to generalize when others could not, the so-called discoverer deserves the credit he gets," Dr. Kellogg added.

"The individual in this case is usually a genius. But the genius is a rare bird. If we look back over the history of science we can count a respectable number of these. But history covers many hundreds of years. How many exist in a single century, and how many today?

"There are about 6,000 professional working biologists in this country today. But how many are Darwins? How many of us scientific men are geniuses? Almost all geniuses are absolute individualists and could not cooperate or work with coordinating organizations. There are also some extreme individualists who by temperament cannot work in teams, although they are not geniuses.

But most of us are not geniuses and we are not liable to make an epoch-making discovery tomorrow. We are able to do a lot of sound scientific work, nevertheless. We are just capable, industrious, well trained workers, with more or less pronounced gregarious instincts, able and willing to work and play together.

"And all advance does not depend on genius. Are we, who are deeply interested in this advance and ready to do our little part to help along, to sit idly by while we await for some rare bird to wing his way over the horizon? We can all do something, and we can do more if we help each other, if we plan together, and work together along lines and by methods which recommend themselves by united control."

AUTO TIRE FORCED RUBBER RESEARCH

Although the rubber industry is old, it is only in the last twenty years since automobile tires have come into use, that it has grown by leaps and bounds. R.P.Dinsmore of the Goodyear Tire and Rubber Company explained the progress of knowledge in this field of science before the American Association for the Advancement of Science.

"Research in the rubber industry dates back to the time of the discovery of vulcanization by Charles Goodyear in 1839," he said. This basic discovery made the industry possible. Very little is yet known even today of the properties of rubber, and this should receive the first consideration in future research. The problems of vulcanization, pigment reinforcement, and resistance to oxidation are pressing to be solved in the industry today."

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HYBRIDIZATION OF MAN AND APE TO BE ATTEMPTED IN AFRICA

The question of how close is the relationship between the anthropoid apes and human kind may be settled by the experiments on hybridization about to be started at the Pasteur Institute at Kindia, French Guinea. Last year the Pasteur Institute of Paris was allotted by the Governor General of French West Africa a large estate three miles from Kindia on an elevated and salubrious plateau four thousand feet above the sea. Here laboratories and residences for the staff and native habitations have been erected, and parks provided for the animals necessary for the preparation of serums and vaccines to counteract tropical diseases.

Since Kindia is situated in the natural habitat of various kinds of apes and monkeys, and since these are susceptible to many human diseases to which other animals are immune, it is hoped that experiments carried on here may lead to knowledge of the cause and cure of some of the ills that afflict humanity. Dr. A. Calmette, sub-director of the Pasteur Institute of Paris, in announcing the program of the African station, stated that physiologists may here find facilities for carrying on experiments, not only in the rejuvenation of old men by the implantation of monkey glands, but also the reverse. Hitherto the difficulty of carrying on physiological or psychological researches with apes and monkeys has been that they could not be bred in captivity, but Major Wilbert, director of the Kindia Institute proposes to overcome this obstacle by resort to artificial fecundation, such as is in common use in horsebreeding.

Still more radical experiments in this field are to be attempted by a Russian biologist, Professor I. Ivanov of Moscow, who sails in January for Kindia, where according to an announcement of the U.S.S.R. Society of Cultural Relations, he will first try to cross the chimpanzee with the orang-utan and these with the gorilla, by artifical impregnation. If these succeed he will try to produce a hybrid between the highest anthropoids and the most primitive of the human race. In an interview given to a Moscow paper just before leaving home, Dr. Ivanov says of his plans:

> "The problem of the possibility of man's crossing with anthropoid apes has occupied me for more than 20 years, but actual test of the matter has so far been impossible. The anthropoid apes do not breed in captivity, and to make the proper experiments it was seen to be necessary to make a special expedition to the lands where they are at home, which involves large expenditures. During the last few years I have made two trips outside of Russia and on these discussed my plans with well known French scientists, Calmette and Roux (director of the Pasteur Institute of Paris), both of whom promised to cooperate in the arrangement of the desired expedition. A short time ago I presented the plan before the Russian Academy of Sciences, and as a result the Academy granted me $10,000 for the proposed expedition, so that I shall be able to depart in November or December for Africa."

There are no authenticated cases of such a crossing between apes and humans in spite of the stories circulated in tropical countries from ancient times to the present. It is Dr. Calmette's hope that competent biological investigators from America or elsewhere may make use of the unique situation and opportunities of the Pasteur Institute at Kindia for physiological experimentation.

EARTH BUILT OF WEDGES NEW GEOLOGICAL THEORY

A world built of wedges, like an orange, only with the wedges more irregular and probably not running all the way to the center, is the gist of a theory which is set forth in recent issue of the Journal of Geology by Dr. Rollen T. Chamberlin of the University of Chicago. According to this new theory, the more level parts of the earth's surface represent the broad ends of these great wedges, and the mountain chains are due to the crumpling up of their sides, where they are crushed against the sides of neighboring wedges. Not all mountain ranges were necessarily formed in this way, but wherever they occur in pairs, with a broadhighland in between, there is a strong probability that such forces have been at work. Examples are pointed out in the Rockies and Sierras in America, with the Great Basin highland between; and in Asia the Tibetan plateau lying between the Himalaya and Kuen Lun mountains.

This theory, was first given wide prominence by a German geologist, Dr. Leopold Kober though Dr. Chamberlin first called attention to it in this country a number of years earlier. Dr. Chamberlin has tested it out not only by studies in the field but by laboratory experiments. He placed wedge-shaped masses of material in a triangular frame of massive steel,and slowly squeezed in the sides. Under the pressure the material buckled and broke in wedge-shaped fractures. The same kind of results were also obtained when layers of loose sand were pushed between wooden blocks. Not only did wedge-shaped "faulting" occur, but miniature mountain ranges piled up on the surface, as called for by the theory.

GREATER TORNADO DAMAGE SEEN AS POPULATION INCREASES

Tornadoes will do more damage as the United States becomes more thickly populated, was the forecast made by two U.S. Weather Bureau meteorologists, Clarence J. Root of Springfield, Ill. and S. D. Flora of Topeka, Kansas, before the recent meeting of the American Association for the Advancement of Science.

"There is no reason to believe that in prehistoric days tornadic storms were fewer or less severe than today," Mr. Root said. "Before the white man came these storms sweeping over treeless prairies could do little harm. The living conditions of the Indians were such that loss of life was slight. The early settlers in isolated cabins were for the most part ignorant of the real menace of the tornado."

As the country becomes still more thickly populated the point will be reached, according to Mr. Flora, where construction will be perfected to resist wind stress more.

"Just as the modern fireproof building was evolved to reduce the enormous fire loss, so we may expect to see buildings in the future withstand violent storms," he said. "A study of the tornado which hit Murphreesboro, Illinois, in March, 1925, showed that better construction would have saved many lives and much property."

According to a compilation of data on storms made by Mr. Root, the state of Iowa leads in important tornadoes, having nine percent. of them all. Missouri, Kansas, Tennessee, Alabama, Minnesota, Illinois, and Wisconsin follow in order.

Out of 384 tornadoes, he stated, seventy-eight per cent. moved northeast. Out of 452 tornadoes, eighty per cent. happened between noon and six o'clock in the evening.

NEW WORLD MADE FOR PLANTS AT BOYCE THOMPSON INSTITUTE

How plants respond to strange conditions never found in nature, such as daylight arbitrarily set at anything from zero to twenty-four hours a day, carbon dioxid ten times as concentrated as it is in normal air, and atmospheric moisture held anywhere that the manipulators want it, was told in an illustrated discussion before the American Association for the Advancement of Science by John M. Arthur of the Boyce Thompson Institution, Yonkers, N.Y.

One lot of plants was given ten times the normal amount of carbon dioxid and at the same time had its daylight period lengthened six hours with powerful electric lights. Red clover plants in this lot blossomed and produced a good crop of hay in 38 days, when under ordinary agricultural conditions two years would have been required for the same results. Spring wheat, barley and oats in the same group produced taller plants, yielding larger crops of both grain and straw, than control plants under normal conditions.

A second series of plants was given light for 24 hours a day, but no extra carbon dioxid. These did little better than the control plants, and on the whole not nearly as well asthose that were given the extra gas. Apparently plants need a rest, for a tomato plant subjected to continuous light treatment finally died. A second tomato plant, given 19 hours of light and 5 hours's rest, survived and grew slowly, while a third, with 7 hours' rest each night, bore fruit.

With its facilities for complete and accurate control of all conditions affecting plant life, the Boyce Thompson Institute plans a long and extensive campaign of research into the fundamental problems of plant physiology.

DOCTORS' CHARGES CHANGE WITH MEDICAL PROGRESS

What should a doctor charge his patient? This is a question that was brought up before the American Association for the Advancement of Science meeting recently by Dr. Michael M. Davis of the United Hospital Fund of New York.

Since the advent of the specialist, the increase in the importance of the laboratory analysis, X-rays and therapeutic services, radical changes have come about in medical fees, Dr. Davis said. In the old days when most physicians did practically the same work, the fees charged were,so to speak, fixed by custom and were fairly uniform.

At the present time fees in cities, and to aless extent in the country, vary from $1.00 a visit to the office of a country practitioner , to $10,000 for a major operation by a surgeon of national reputation. Other costs besides doctors' fees have arisen, such as expendituresfor laboratory and X-ray tests, nursing, and hospital charges.

Over a fourth of the entire medical profession gives a portion of its time free to hospitals and charitable institutions and clinics. These are usually the best trained and best known doctors and their fees to the paying patients are probably increased in proportion to the amount of time they give away, Dr. Davis said.

Studies of family incomes show that the average middle class person can never afford to have any but very minor illnesses, if well trained physicians and most approved forms of diagnosis and treatment are secured. Important adjustments will have to be made in the future to fit the fee to the average pocketbook, and to pay the doctor at the same time, Mr. Davis' report showed.

INTELLIGENT STUDENTS SHOW MOST SPEED

The rate at which an individual thinks and acts appears to be as much a part of his particular personality as his smile or the tone of his voice. He is characteristically fast, or slow, or medium. How this constant rate of speed, is revealed in intelligence tests was described by Prof. E. G. Boring and Dr. C. C. Pratt, of Harvard University, before the American Psychological Association recently.

Harvard students were given intelligence tests in which they had to solve puzzles, complete sentences, and do a wide variety of mental tasks, all as quickly as they could. The student who made the highest speed record in one test made the highest in most of the others, and the other students kept pretty closely in the same order for all the tests.

The possibility had been suggested that individuals who take such tests vary in speed according to their ability to concentrate and to organize their forces for difficult mental effort. But the experiment showed that the student who is slow at mental gymnastics is also slow when told merely to press a key as soon as he hears a signal.

The two psychologists pointed out that very little is known about the nature of intelligence, and that speed may turn out to be the most important factor.

SHOW FARMERS HOW TO CURE SWEET CORN QUICKLY

Sometimes unexpected early frosts have cheated farmers out of their seed corn, and corn growers have tried all sorts of tricks to force the corn to dry early, so that when the frost does come it can do no harm.

Prof. A. T. Erwin of the Iowa Agricultural Experiment Station has tried to find if there is any way of drying full grown corn out ahead of time and making it more sure of escaping the frost. He told of the results of his tests before the American Association for the Advancement of Science meeting.

The old fashioned method used by some farmers of cutting the tops of the corn a joint above the ear while the corn is in the denting stage, cutting its teeth, did not help the curing or drying of the corn, Prof. Erwin found. When the corn was cut and shocked, the results were also unsatisfactory.

But when the husks were slit and the seeds exposed to the sun and wind while the corn was still standing in the fields, it cured quickly and about two weeks' time was saved. When only a few ears in a field were slit, the damage from birds was considerable , but when an entire field was treated in that way, it did not amount to anything.

This method may mean a considerable saving in such states as Iowa and Illinois where nearly a fourth of all the corn in the United States is grown. It is especially useful in sweet corn growing because the large amount of sugar in the corn holds the water longer.

As long as the corn contains as much as 20 per cent. water, there is danger of spoilage due to freezing. Roasting ears have about 85 per cent. moisture, and somewhere between denting time and frost, the corn must lose more than the 65 per cent. difference.

TABLOID BOOK REVIEW

THE MARVELS OF ANIMAL INGENUITY. By C. A. Ealand. Lippincott. 1925
SCIENTIFIC AMUSEMENTS AND EXPERIMENTS. By C. R. Gibson, Lippincott. 1926.

Mr. Ealand's book is a natural history wonder-book for young people. For the most part it serves it purpose very well, though the author does not discriminate between the mechanical work done by animals, which might legitimately be called animal ingenuity, and adaptations such as the structure of the honey ant and the coloring of birds' eggs. He is also perhaps a little too ready to credit an animal with more intelligence than it really possesses; for example, he perpetuates the myth of beavers felling trees exactly in the right direction. Mr. Gibson's work is frankly of a lighter character, consisting of a miscellaneous collection of elementary experiments in physical chemical and psychological "magic" for the amusement of children.

HASTENS GROWTH OF CUTTINGS BY USING OXIDATION AGENTS

A new method insuring quick rooting of cuttings, and thereby saving time and space in vineyard and nursery operations, was described before the American Association for the Advancement of Science by A.J.Winkler of the California agricultural experiment station.

Mr. Winkler took advantage of the well-known physiological fact that rapid growth is a process requiring rapid use of oxygen by the tissues. He treated grape cuttings with chemicals like hydrogen peroxide and potassium ferricyanide, which belong in the class known as oxidising reagents, having the effect of speeding up the supply and use of oxygen. In all cases he found that the production and growth of roots on his cuttings was materially hastened by the treatment.